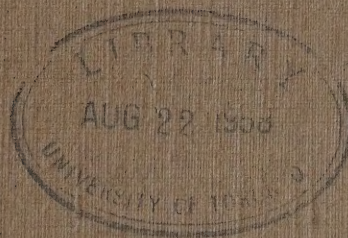


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Report 101

HYDRO-ELECTRIC INQUIRY COMMISSION

REPORT
ON
RIDEAU SYSTEM

W. D. GREGORY, CHAIRMAN
M. J. HANEY
LLOYD HARRIS
J. ALLAN ROSS
R. A. ROSS

COMMISSIONERS

JOSEPH H. W. BOWER
SECRETARY



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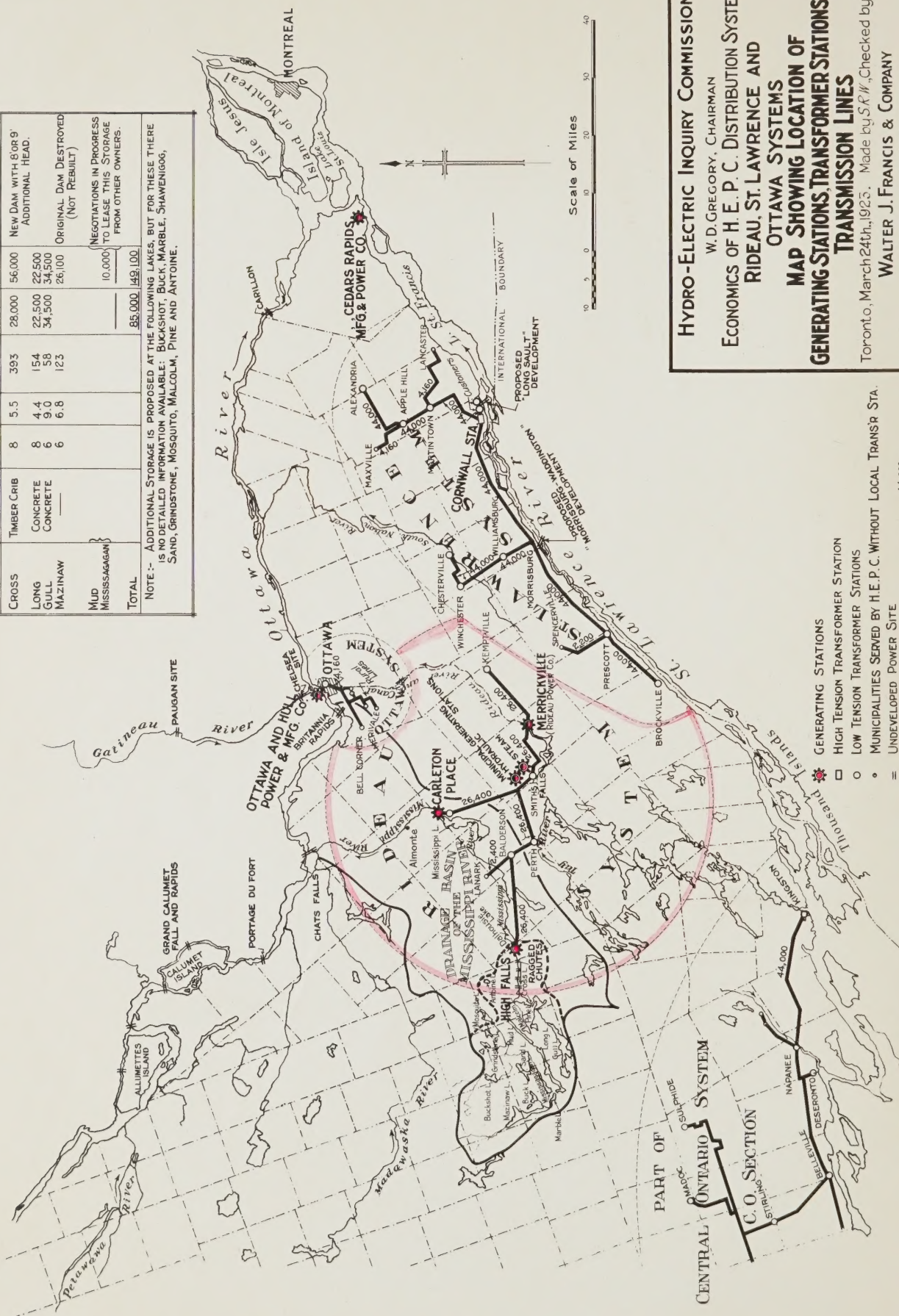
R I D E A Y S Y S T E M

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TABLE OF MISSISSIPPI RIVER STORAGE RESERVOIRS							
NAME OF LAKE	DAM TYPE OF CONSTRUCTION	STORAGE AREAS: SQ. MILES		REMARKS			
		HEAD, FEET	WATERSHED DRAINAGE, ACRES				
		PRESENT	FUTURE				
CROSS	TIMBER CRIB	8	5.5	393	28,000	56,000	NEW DAM WITH 8 OR 9' ADDITIONAL HEAD.
LONG	CONCRETE	8	4.4	154	22,500	22,500	ADDITIONAL HEAD.
GULL	CONCRETE	6	9.0	58	34,500	34,500	ORIGINAL DAM DESTROYED (NOT REBUILT)
MAZINAW	—	6	6.8	123	26,100	26,100	
Mud Mud-Sagagan						10,000	NEGOTIATIONS IN PROGRESS TO LEASE THIS STORAGE FROM OTHER OWNERS.
TOTAL					85,000	149,100	

NOTE:— ADDITIONAL STORAGE IS PROPOSED AT THE FOLLOWING LAKES, BUT FOR THESE THERE IS NO DETAILED INFORMATION AVAILABLE: BUCKSHOT, BUCK, MARBLE, SHAWENIGOG, SAND, GRINDSTONE, MOSQUITO, MALCOLM, PINE AND ANTOINE.

NOTE:- ADDITIONAL STORAGE IS PROPOSED AT THE FOLLOWING LAKES, BUT FOR THESE THERE IS NO DETAILED INFORMATION AVAILABLE: BUCKSHOT, BUCK, MARBLE, SHAWENIGOG, SAND, GRINDSTONE, MOSQUITO, MALCOLM PINE AND ANTOINE.



HYDRO-ELECTRIC INQUIRY COMMISSION

W. D. GREGORY, CHAIRMAN

ECONOMICS OF H. E. P. C. DISTRIBUTION SYSTEMS

RIDEAU, ST. LAWRENCE AND

OTTAWA SYSTEMS

MAP SHOWING LOCATION OF GENERATING STATIONS, TRANSFORMER STATIONS AND TRANSMISSION LINES

Toronto, March 24th., 1925. Made by S.R.W., Checked by Wza.

WALTER J. FRANCIS & COMPANY

CONSULTING ENGINEERS

To His Honour, Henry Cockshutt,

Lieutenant-Governor of the Province of Ontario.

May It Please Your Honour:

The undertaking of the Hydro-Electric Power Commission of Ontario (hereinafter referred to as the "Commission") serving the Rideau System, has been investigated in accordance with the directions contained in Your Honour's committee to us and we

**Map Showing part of the Trent Section of the
Central Ontario System, the Rideau, Ottawa
and St. Lawrence Systems.**

Messrs. Price, Waterhouse & Company, on the accounts of the System.

The Rideau System

COPY

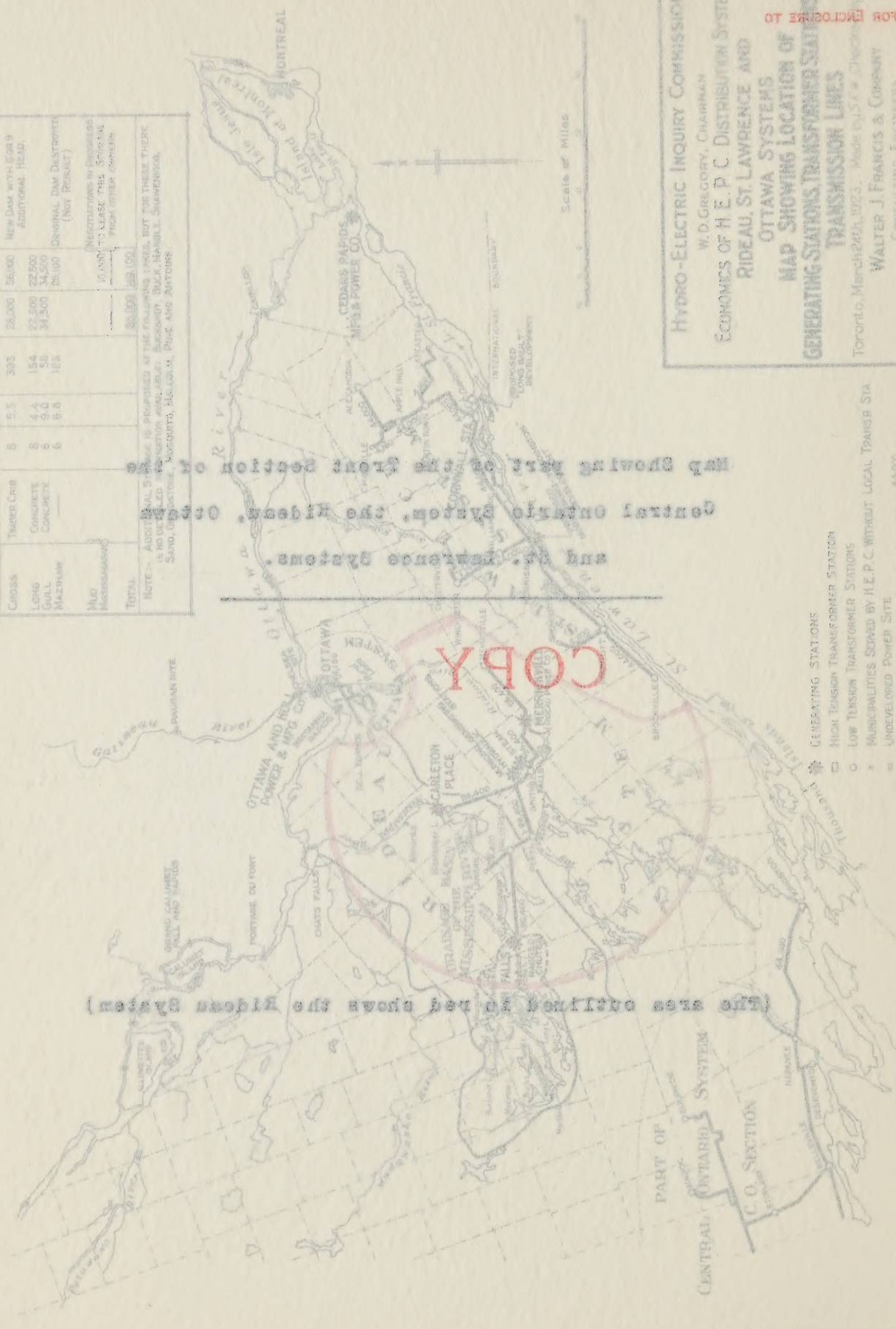
The municipal corporations comprising the system on October 31st, 1932, were those of Carleton Place, Appleton, Kanark, Perth and Smith's Falls. On the accompanying map is shown the location of the generating stations, transmission stations and transmission lines serving the system. The part of the Province which economically may be supplied with electrical power (The area outlined in red shows the Rideau System) the map enclosed in red lines, and consists of the County of Lanark and parts of the Counties of Grenville, Leeds, Frontenac, Renfrew and Carleton, and extends north and south fifty miles and east and west about the same distance.

TABLE OF MISSISSIPPI RIVER STORAGE CAPACITY						
NAME OF LAKE	DAM TYPE OF CONSTRUCTION	STORAGE AREA, SQUARE MILES	HEAD, FEET	PRESENT FUTURE	REMARKS	
CROSS	TIMBER CORE	8	5.5	393	25,000	
LONG	CONCRETE	8	4.4	154	22,500	
GULL	CONCRETE	8	9.0	58	34,500	
MAZINAW	CONCRETE	6	8.8	125	20,100	
MUD (MICROGRAVIMETER)					10,000 TO LEASE THIS STORAGE FROM OTHER OWNERS	
TOTAL					80,000 109,100	

NOTE: - ADDITIONAL STORAGE IS PROVIDED AT THE FOLLOWING PLACES, BUT NOT THESE THERE IS NO DETAIL: - WASHINGTON AND JEFFERSON DAMS, BUCK HARBOR, SHENANDOAH, SAND, GIBBSVILLE, NORTON, MOUNTAIN, PINE AND ANYONE

Map Showing part of the Great Section of the Central Ontario System, the Rideau, Ottawa and St. Lawrence Systems.

(The area outlined in red shows the Rideau System)



HYDRO-ELECTRIC INQUIRY COMMISSION
W. D. GREGORY, CHAIRMAN
ECONOMICS OF H. E. P. C. DISTRIBUTION SYSTEM
RIDEAU, ST. LAWRENCE AND
OTTAWA SYSTEMS
MAP SHOWING LOCATION OF
GENERATING STATIONS, TRANSFORMER STATIONS AND
TRANSMISSION LINES
Toronto, March 26th, 1923. Made by S. A. J. FRANCIS & COMPANY
WALTER J. FRANCIS & COMPANY
CONSULTING ENGINEERS

- GENERATING STATIONS
- HIGH TENSION TRANSFORMER STATION
 - LOW TENSION TRANSFORMER STATIONS
 - MUNICIPALITIES SERVED BY H.E.P.C. WITHOUT LOCAL TRANSFER STATION
 - UNDEVELOPED POWER SITE
 - TRANSMISSION LINE VOLTAGE SHOWN THIS SIDE OF LINE

Hydro-Electric Inquiry Commission
COPY FOR ENCLOSURE TO

To His Honour, Henry Cockshutt,

Lieutenant-Governor of the Province of Ontario.

May It Please Your Honour:

The undertaking of the Hydro-Electric Power Commission of Ontario (hereinafter referred to as the "Commission") serving the Rideau System, has been investigated in accordance with the directions contained in Your Honour's commission to us and we respectfully submit our report thereon. Accompanying our report are the reports of our Consulting Engineer, Mr. Walter J. Francis, on the Engineering Economics, and of our Accountants, Messrs. Price, Waterhouse & Company, on the Accounts of the System.

The Rideau System

The municipal corporations composing the Rideau System on October 31st, 1922, were those of Carleton Place, Kemptville, Lanark, Perth and Smith's Falls. On the accompanying map is shown the location of the generating stations, transformer stations and transmission lines serving the system. The part of the Province which economically may be supplied with electrical power or energy from the works of the system is shown on the map enclosed in red lines, and consists of the County of Lanark and parts of the Counties of Grenville, Leeds, Frontenac, Renfrew and Carleton, and extends north and south fifty miles and east and west about the same distance.

TO THE HONORABLE, JAMES H. HARRIS,

Minister of the Interior of the Province of Ontario.

May 11 Please Your Honor:

The undersigned of the Hydro-Electric Power Com-

mission of Ontario (hereinafter referred to as the "Commission")

has the honor to acknowledge the receipt of your letter of the 10th inst.

and in reply to inform you that the Commission has the honor to

acknowledge the receipt of your letter of the 10th inst.

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On October 31st, 1922, the works of the system consisted of a 2800 horse-power generating plant at High Falls, on the Mississippi River, constructed by the Commission between 1918 and 1920; a 530 horse-power generating station at Carleton Place on the same river, acquired by the Commission in 1919; 76.65 miles of high voltage transmission lines and 4.97 miles of 2300-volt line constructed by the Commission.

The several municipal corporations receive their supply at low voltages through five sub-stations at Balderson, Carleton Place, Kemptville, Perth and Smith's Falls. Each of these stations supplies but one municipality, with the exception of that at Balderson which supplies the Village of Balderson and from which the Village of Lanark is served over the above mentioned 2300-volt line. The distributing equipment of the five stations has been designed to permit of the change in transmission from 26,400 volts to 44,000 volts, the latter being the voltage of the receiving stations of the St. Lawrence System, which purchases all the power it consumes. Thus, if increased power be required for the St. Lawrence System, the same may be supplied from any surplus available from the Rideau System.

Prior to the construction of the High Falls plant and acquisition of the Carleton Place generating station, the Commission, on January 25th, 1918, entered into an agreement with the Rideau Power Company, Limited, operating a generating plant at Merrickville, for the purchase of power to supply

COPY FOR ENCLOSURE TO

the municipal corporations which had entered into contracts with the Commission. This plant was stated to have a capacity of 1,000 horse-power, and the Commission agreed to purchase a minimum of 500 horse-power for 20 years at \$14.00 per horse-power per annum, the quantity of power to be increased, if required, until the ultimate supply reached the total available capacity of the plant after first supplying the requirements of the municipality of Merrickville, which also purchases power direct from the company. The amount of power supplied to the Commission from this source was in 1919, 669 horse-power; in 1920, 479 horse-power; in 1921, 363 horse-power, and in 1922 about 480 horse-power. As the company could not fulfill its obligation to supply a minimum of 500 horse-power after providing for the Merrickville requirements, the Commission did not pay for the full 500 horse-power but only for the amount actually taken, as above.

During the latter part of 1919 and the early part of 1920, the municipalities of Smith's Falls and Perth were greatly handicapped by the shortage of power at Merrickville due to lack of water in the Rideau Canal. This necessitated the temporary operation of the steam plant at Smith's Falls, resulting in a large increase in operating expenses. The shortage was relieved when the first unit at High Falls was put into service on May 1st, 1920.

On March 1st, 1922, the Commission agreed to supply the Grenville Crushed Rock Company, Limited, of the town of Smith's Falls, with 650 electrical horse-power at \$45.00 per horse-power per annum for a period of four years from April 1st, 1922. This agreement may be extended for further terms of one year each, upon the mutual agreement of both parties.

During the winter of 1922-23 extreme low water conditions existed on the Mississippi River, resulting in a shortage of several hundred horse-power at the High Falls plant and at Merrickville. This made it necessary to operate the hydro-electric plant at Carleton Place and one of the municipal plants at Smith's Falls.

To prevent the recurrence of such shortage of power at the High Falls plant, the Commission proposed that additions to and improvements in the water storage be made by building new dams at the lakes at the headwaters of the Mississippi River during the year 1923.

The horse-power billed for the year ending October 31st, 1922, was 2,618.7, of which about 2,138 were generated at the works of the Commission and about 480 purchased from the Rideau Power Company, Limited. Of the 2,618.7 horse-power, 2,259.6 were supplied to municipal corporations and 358.9 to companies. The rated capacity of the High Falls plant being 2,800 and that of the Carleton Place generating

station approximately 535 electrical horse-power, it is apparent that with the supply available under the Commission's agreement with the Rideau Power Company, Limited, ample power is obtainable for present requirements of the system provided there are sufficient facilities for high water storage.

At Cross, Gull, Long and Mazinaw Lakes, at the headwaters of the Mississippi, water storage of 2,620,000,000 cubic feet has been developed by the Mississippi River Improvement Company by means of rock filled, timber crib dams, and it is stated by the engineers of the Commission that this storage can be materially increased by further conservation works at Mud, Mississagagon, Lashwahamah, Buckshot and Grindstone Lakes. The storage is operated by the Mississippi River Improvement Company, a private company which was formed by the power site owners downstream, the expenses of operation being met by the power users, including the Commission. The Commission holds 75 shares of the capital stock of the Mississippi River Improvement Company of a par value of \$100.00 per share.

On the Mississippi River about four miles upstream from the High Falls plant, commences a series of four rapids known respectively as Ragged Chutes, 39 feet head; Island Rapids, 38 feet head; Otter Rapids, 15 feet head; and King Rapids, 24 feet head. These four rapids aggregate

about 116 feet total head, and reconnaissance surveys made by the Commission indicate that an economical development may be made by taking in at least seventy-seven feet and possibly the whole available head. Such a development would be somewhat similar to that at High Falls and would have the benefit of the same storage. A plant of 3,000 to 4,000 horse-power might possibly be installed at this site if the storage said to be possible be fully utilized, and the local constructional conditions prove feasible and economical upon further investigation.

The drainage area above this site is about 450 square miles, the minimum precipitation is said to be 31.5 inches, and the average 35 inches per annum. The minimum monthly run-off of the river is given as 96 cubic feet per second with a yearly average of 513 cubic feet per second. These figures are based on precipitation records from 1915 and on gaugings from the year 1919.

Capital Investment at October 31, 1922 - \$1,079,746.80

Under authority of Order-in-Council dated July 4th, 1918, the Commission purchased the privately owned rights in an undeveloped power site on the Mississippi River, together with certain lands, for \$10,478.00. The Order-in-Council empowered the Commission:

1. To acquire by purchase or lease or otherwise the necessary lands, waters, water privileges and water powers for the developing of the said water power.
2. To purchase the necessary material and equipment for construction of plant for generation of 3,000 horse-power of electrical energy and for its transformation for transmission to the various municipalities in that district.
3. To purchase the necessary material and equipment for the construction of transmission lines and transformer stations for the delivery of the said power to the various municipalities in that district.

The construction of a power development on this site was commenced in 1918 and completed in May, 1920. It is commonly known as the "High Falls Power Development".

In 1919, under authority conferred by Order-in-Council dated May 20th, 1919, the Commission purchased for \$60,000.00 from the town of Carleton Place a power plant on the Mississippi River, consisting in the main of a dam, buildings, machinery, etc., together with a tract of land, and seventy-five shares of capital stock of a par value of \$100 each of the Mississippi River Improvement Company, Limited, on which \$4,125.00 had been paid, representing assessments to that date against the shareholders. The Commission did not take up on its books a separate valuation of this capital stock due to the uncertain value thereof. Further information relative to the Mississippi River Improvement Company is given on Exhibit V of Messrs. Price, Waterhouse

to be able to control the situation in the future.

[illegible][illegible]

17. *Author's address:* Department of Mathematics, University of California, San Diego, La Jolla, CA 92037, U.S.A.

"The Power Factor Problem"

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& Company's report on the Rideau System dated November 7th, 1922.

The investment in the plant, equipment, etc., of the Rideau System for the five years ending October 31st, 1922, is as follows (cents omitted):

	1918	1919	1920	1921	1922
Power Develop- ments	\$ 30,955	\$430,516	\$ 748,941	\$ 756,285	\$ 756,926
Wood Pole Lines	103,469	218,717	233,602	260,654	261,964
Transformer Stations	17,174	32,234	42,844	57,065	60,856
T o t a l	\$151,598	\$681,467	\$1,032,387	\$1,074,004	\$1,079,746

The investment of \$756,926 in the power developments is represented by:

High Falls Development	\$696,055
Carleton Place Development	60,871
	<u>\$756,926</u>

In a letter dated June 26th, 1918, addressed to Sir William Hearst by the Chairman of the Commission, is contained the following information regarding the estimated cost of the High Falls Development:

"The work contemplated consists of the complete development of the High Falls for 3,000 horse-power, and 22 miles of high tension line to Perth at a total estimated cost of \$340,000."

It will therefore be noted that the actual cost exceeded the estimate by more than 100%.

Investment in the plant, equipment, etc., of

1944.

The investment in the plant, equipment, etc., of

the plant, equipment, etc., of the five years ending October 31st,

1944, is as follows (estimated):

1944	1943	1942	1941	1940
700,000	700,000	700,000	700,000	700,000
700,000	700,000	700,000	700,000	700,000
700,000	700,000	700,000	700,000	700,000
700,000	700,000	700,000	700,000	700,000
700,000	700,000	700,000	700,000	700,000

The investment in the plant, equipment, etc., of

the plant, equipment, etc., of the five years ending

October 31st, 1944, is as follows (estimated):

The investment in the plant, equipment, etc., of the five years ending October 31st, 1944, is as follows (estimated):

The investment in the plant, equipment, etc., of the five years ending October 31st, 1944, is as follows (estimated):

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The investment in the plant, equipment, etc., of the five years ending October 31st, 1944, is as follows (estimated):

The following indicates the capital cost per rated plant horse-power developed at October 31st, 1922:

Power Development	\$226.96
Transmission Lines	78.55
Transforming and Distributing Stations	18.24
	<u>\$323.75</u>

The expenditures on the Rideau System were made out of moneys advanced by the Province of Ontario and the following is a comparison of the advances by the Province with expenditures of the Commission by years:

Period	Advances by Province	Expenditures by Commission	Unexpended or (over-expended)
Year ending October 31st			
1918	\$ 107,945.00	\$ 151,598.61	(\$43,653.61)
1919	500,000.00	529,868.37	(29,868.37)
1920	363,000.00	350,920.94	12,079.06
1921	42,416.07	41,616.53	799.54
1922	5,200.00	5,742.35	(542.35)
T o t a l	\$1,018,561.07	\$1,079,746.80	(\$61,185.73)

The funds to meet the expenditures made by the Commission, in excess of the sums advanced by the Province, were obtained from advances made by the Province for other purposes.

As at October 31st, 1921, the Engineers of the Commission estimated that additional funds of \$100,000 and of \$20,000 respectively would be required for the Rideau System during the fiscal years 1922 and 1923 to complete minor ex-

tensions and betterments at High Falls and other stations in the system, together with expenditures on account of rural distribution, and appropriations therefor were made by the Legislature. Of the \$100,000 appropriated for the year ending October 31st, 1922, but \$5,200.00 was advanced and the expenditure of the Commission for that year was \$5,742.35.

Reserve for Renewals at October 31st, 1922 - \$33,771.00

The balance in the reserve for renewals at October 31st, 1921, amounted to \$38,365.47.

During the period from the commencement of operations in 1918 to October 31st, 1920, the additions to the reserve for renewals in respect of properties of the Rideau System were provided through the inclusion in the cost of power to the municipalities of an annual charge of 2.25% on the capital investment. Interest at the rate of 4% per annum on the balance in the reserve account has been credited to that account.

On the recommendation of its Engineers, the Commission, commencing in the fiscal year 1921, reduced the annual renewal rate from 2.25% to 1.85% on the total capital investment while the interest rate of 4% remained unchanged. The accounts of the Commission were so adjusted that the rate of 1.85% was made effective from 1918 to October 31st, 1920, and the same rate obtained to October 31st, 1921. The amount of

tensions and requirements of High Falls and other stations
in the system, together with expenditures for interest on
bonds, depreciation, and maintenance of the system, have been
paid by the Commission. The Commission has also paid for the
cost of the High Falls station, and for the cost of the
expansion of the Commission for that year was

\$1,441.00.

REVENUE FOR THE YEAR 1921 - \$1,441.00

The balance in the reserve for renewals at October
31st, 1921, amounted to \$58,388.47.

During the year the Commission has expended
for the purpose of the reserve for renewals, the balance of the reserve
for renewals in respect of the High Falls station
was provided through the inclusion in the cost of power of
the amortization of the annual interest on the bonds of the
High Falls station. Interest on the bonds of the High Falls station
in the reserve account has been credited to that account.

On the recommendation of the Engineers, the Commission
has recommended in the fiscal year 1921, to increase the annual
interest rate from 4.5% to 5.5% on the total bonded investment
which will be invested in the High Falls station. The
amount of the investment was calculated at the rate of
1.5% and was effective from 1918 to 1921, 1922, and
the same was included in the fiscal year 1921. The amount of

the adjustment by years is as follows:

Particulars	1919	1920	Together
Reduction in Annual Provision	\$749.37	\$2,578.75	\$3,328.12
Reduction in Interest thereon	-	29.98	29.98
T o t a l	\$749.37	\$2,608.73	\$3,358.10

The balance of \$38,365.47 in the reserve account after giving effect to the aforementioned reduction comprised the following:

Particulars	Provision	Interest	Together
1918 to October 31, 1919 (part year)	\$ 3,465.85	-	\$ 3,465.85
Fiscal year ending			
October 31st, 1920	11,926.83	\$ 138.62	12,065.45
" 1921	19,197.81	621.25	19,819.06
Together	\$34,590.49	\$ 759.87	\$35,350.36
Add - Reserve applicable to equipment transferred to the System	\$2,967.75		
Interest applicable thereto		154.87	3,122.62
			\$38,472.98
Deduct - Sundry Charges			107.51
			\$38,365.47

In December, 1922, the Commission, on the recommendation of its Chief Engineer, decided that the renewal rate for the Rideau System should be fixed at 1.0% and that this rate be made retroactive to date of first operation. The effect of this

[illegible]

Year	1951	1952	1953	1954
Number of cases	1,000	1,200	1,500	1,800
Number of deaths	50	60	70	80
Number of recoveries	950	1,140	1,430	1,720

The balance of \$58,263.47 in the reserve account after

[illegible]

1. Add - Reserve applicable to equipment transferred to the system
2. Interest applicable thereto

БЕРТАНДЪ УТЪННЪ - ЖЕНА

in December, 1923, the Commission, or the Commission-
ers of the United States, decided that the National Board of
the United States should be given the right to make the
case necessary to the Board of River operations. The United States

revision was to reduce the renewal reserve by \$16,242.07, or to \$22,123.40 as of October 31st, 1921. To this amount of \$22,123.40 there was added for the fiscal year ending October 31st, 1922, provided by charges in the cost of power for the year and interest accumulations, a net amount of \$11,647.60, bringing the amount at the credit of the account on October 31st, 1922, to \$33,771.00.

Prior to the reduction of renewal rate made in December, 1922, our Consulting Engineer expressed the opinion that the reserve for renewals was somewhat larger than was necessary, but he has not yet reported upon the recent reduction.

COPY

Reserve for Sinking Fund

As under the authority conferred upon it by the Power Commission Act, the Commission had relieved the municipal corporations of the system from payment on account of sinking fund for the first five years of their contracts, and as in no case had the five years expired, no payments had been made on account of sinking fund at October 31, 1922.

The annual payments sufficient to form in thirty years, with interest at four per cent. per annum, a sinking fund for the repayment of the capital investment of \$1,079,746.80 as of October 31st, 1922, will amount to \$19,435.44. Upon the basis of the average horse-power billed

during the fiscal year ending October 31st, 1922, namely, 2,618.7 horse-power, the annual additional charge in the "cost of power" supplied to the system will be \$7.42 per horse-power. Provincial securities purchased by the Commission with sums paid on account of sinking fund and delivered to the Treasurer of Ontario are the only security available to the Province for its advances to meet the cost of the works of the system. Until payments on account of sinking fund are made by the municipal corporations in the system, the Province has no security for these advances and the corporations acquire no proprietary interest in the works.

COPY

Reserve for Contingencies on October 31st, 1922 - \$7,673.25

On October 31st, 1921, the amount shown on the books of the Commission as at the credit of the Reserve for Contingencies was \$1,183.31. Our Consulting Engineer expressed the opinion that in view of the heavy losses which might be occasioned through catastrophe, this reserve should be augmented by increasing the charge therefor in the annual cost of power until the fund reached \$15,000 or \$20,000, when the rates might be adjusted to suit conditions found after several further years of experience. For the fiscal year ending October 31st, 1922, a charge of \$1.00 per horse-power billed was added to the cost of power on account of contingencies reserve. The total of

and the corporations receive no proprietary interest in
system, the Province has no security for these advances
standing fund are made by the municipal corporations in the
of the series of the system. Until payments on account of
available to the Province for its advances to meet the cost
delivered to the Treasurer of Ontario are the only security

[illegible]

this charge, \$2,618.70, and the net profit realized from the sale of power to private companies, \$3,823.00, were appropriated to contingencies reserve account, and with accrued interest brought the amount to the credit of the account on October 31st, 1922, to \$7,673.25, or about fifty per cent. of the minimum amount which our Consulting Engineer considered should be accumulated.

Accounts with Municipal Corporations

To the end of the fiscal year 1922, the amounts charged to and collected from the municipal corporations of the system exceeded the actual cost of power as adjusted and apportioned by the Commission. This was in a large measure due to the estimated interim power rates including provision for renewal reserve at rates exceeding those subsequently fixed and made retroactive. The effect of revisions of the rate for renewals was to leave balances at the credit of the several municipal corporations on October 31st, 1922. These credit balances were as follows:

<u>Municipal Corporation</u>	<u>Balance</u>
Carleton Place	\$11,191.91
Kemptville	2,446.38
Lanark	941.89
Perth	4,094.87
Smith's Falls	11,829.93
T o t a l	<u>\$30,504.78</u>

1947, at \$7.475.00, we found that the minimum amount which we considered sufficient should be

made available. The results of the study are discussed.

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10.1.19.31
 2.446.33
 241.33
 4.044.33
 11.1.19.31

Results of Operation

The operating account of the system from the commencement of operations to October 31st, 1922, showing the adjustment in renewal charges, is as follows (cents omitted):

Particulars	Month of Oct., 1918	Year ending October 31st			
		1919	1920	1921	1922
Revenue \$	\$494	\$27,351	\$65,523	\$89,014	\$98,631
Operating Expenses, Fixed Charges, etc					
Power Purchased	-	\$ 9,366	\$ 6,705	\$ 5,077	\$ 6,712
Operating	\$211	1,382	5,074	8,368	
Maintenance	64	859	3,132	2,511	
Overhead and					
General Expense	38	3,202	6,330	6,111	
Interest	191	8,119	29,368	47,216	53,673
Renewals	-	4,215	14,505	19,198	10,756
Contingencies	-	208	409	533	2,618
T o t a l s	\$494	\$27,351	\$65,523	\$89,014	\$94,807
Loss - Reduction arising in con- nection with the revision of re- newal rates	-	2,342	8,058	8,821	-
Adjusted Cost	\$494	\$25,009	\$57,465	\$80,193	\$94,807
Horse-Power Billed		830.8	1,637.5	2,131.7	2,618.7
Adjusted Cost per horse-power Billed		\$30.10	\$35.09	\$37.62	\$36.20

Of the revenue for 1922, the sum of \$15,682 was received from private companies. The balance of revenue for that year represents the amount received from municipal corporations after deducting the sum of \$18,468.51 collected from them in excess of the sums required to be paid by them for power supplied in the period. The revenue shown in the above statement for the fiscal years 1919, 1920 and 1921 is also subject to reduction to the extent of the revisions made in the renewal charges. The difference between the revenue and costs of operation for the fiscal year ending October 31st, 1922, in the amount of \$3,824, represents profits on power sold to private companies, which has been transferred to the Contingencies Reserve by the Commission.

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The operating account of the system for the year 1960-61 was as follows:

Work of operations in Section 214, 1944 showing the adjustment

in removal studies. In an effort to reduce the

1941		1940		1939		1938		1937		1936		1935		1934		1933		1932		1931		1930		1929		1928		1927		1926		1925		1924		1923		1922		1921		1920		1919		1918		1917		1916		1915		1914		1913		1912		1911		1910		1909		1908		1907		1906		1905		1904		1903		1902		1901		1900		1899		1898		1897		1896		1895		1894		1893		1892		1891		1890		1889		1888		1887		1886		1885		1884		1883		1882		1881		1880		1879		1878		1877		1876		1875		1874		1873		1872		1871		1870		1869		1868		1867		1866		1865		1864		1863		1862		1861		1860		1859		1858		1857		1856		1855		1854		1853		1852		1851		1850		1849		1848		1847		1846		1845		1844		1843		1842		1841		1840		1839		1838		1837		1836		1835		1834		1833		1832		1831		1830		1829		1828		1827		1826		1825		1824		1823		1822		1821		1820		1819		1818		1817		1816		1815		1814		1813		1812		1811		1810		1809		1808		1807		1806		1805		1804		1803		1802		1801		1800		1799		1798		1797		1796		1795		1794		1793		1792		1791		1790		1789		1788		1787		1786		1785		1784		1783		1782		1781		1780		1779		1778		1777		1776		1775		1774		1773		1772		1771		1770		1769		1768		1767		1766		1765		1764		1763		1762		1761		1760		1759		1758		1757		1756		1755		1754		1753		1752		1751		1750		1749		1748		1747		1746		1745		1744		1743		1742		1741		1740		1739		1738		1737		1736		1735		1734		1733		1732		1731		1730		1729		1728		1727		1726		1725		1724		1723		1722		1721		1720		1719		1718		1717		1716		1715		1714		1713		1712		1711		1710		1709		1708		1707		1706		1705		1704		1703		1702		1701		1700		1699		1698		1697		1696		1695		1694		1693		1692		1691		1690		1689		1688		1687		1686		1685		1684		1683		1682		1681		1680		1679		1678		1677		1676		1675		1674		1673		1672		1671		1670		1669		1668		1667		1666		1665		1664		1663		1662		1661		1660		1659		1658		1657		1656		1655		1654		1653		1652		1651		1650		1649		1648		1647		1646		1645		1644		1643		1642		1641		1640		1639		1638		1637		1636		1635		1634		1633		1632		1631		1630		1629		1628		1627		1626		1625		1624		1623		1622		1621		1620		1619		1618		1617		1616		1615		1614		1613		1612		1611		1610		1609		1608		1607		1606		1605		1604		1603		1602		1601		1600		1599		1598		1597		1596		1595		1594		1593		1592		1591		1590		1589		1588		1587		1586		1585		1584		1583		1582		1581		1580		1579		1578		1577		1576		1575		1574		1573		1572		1571		1570		1569		1568		1567		1566		1565		1564		1563		1562		1561		1560		1559		1558		1557		1556		1555		1554		1553		1552		1551		1550		1549		1548		1547		1546		1545		1544		1543		1542		1541		1540		1539		1538		1537		1536		1535		1534		1533		1532		1531		1530		1529		1528		1527		1526		1525		1524		1523		1522		1521		1520		1519		1518		1517		1516		1515		1514		1513		1512		1511		1510		1509		1508		1507		1506		1505		1504		1503		1502		1501		1500		1499		1498		1497		1496		1495		1494		1493		1492		1491		1490		1489		1488		1487		1486		1485		1484		1483		1482		1481		1480		1479		1478		1477		1476		1475		1474		1473		1472		1471		1470		1469		1468		1467		1466		1465		1464		1463		1462		1461		1460		1459		1458		1457		1456		1455		1454		1453		1452		1451		1450		1449		1448		1447		1446		1445		1444		1443		1442		1441		1440		1439		1438		1437		1436		1435		1434		1433		1432		1431		1430		1429		1428		1427		1426		1425		1424		1423		1422		1421		1420		1419		1418		1417		1416		1415		1414		1413		1412		1411		1410		1409		1408		1407		1406		1405		1404		1403		1402		1401		1400		1399		1398		1397		1396		1395		1394		1393		1392		1391		1390		1389		1388		1387		1386		1385		1384		1383		1382		1381		1380		1379		1378		1377		1376		1375		1374		1373		1372		1371		1370		1369		1368		1367		1366		1365		1364		1363		1362		1361		1360		1359		1358		1357		1356		1355		1354		1353		1352		1351		1350		1349		1348		1347		1346		1345		1344		1343		1342		1341		1340		1339		1338		1337		1336		1335		1334		1333		1332		1331		1330		1329		1328		1327		1326		1325		1324		1323		1322		1321		1320		1319		1318		1317		1316		1315		1314		1313		1312		1311		1310		1309		1308		1307		1306		1305		1304		1303		1302		1301		1300		1299		1298		1297		1296		1295		1294		1293		1292		1291		1290		1289		1288		1287		1286		1285		1284		1283		1282		1281		1280		1279		1278		1277		1276		1275		1274		1273		1272		1271		1270		1269		1268		1267		1266		1265		1264		1263		1262		1261		1260		1259		1258		1257		1256		1255		1254		1253		1252		1251		1250		1249		1248		1247		1246		1245		1244		1243		1242		1241		1240		1239		1238		1237		1236		1235		1234		1233		1232		1231		1230		1229		1228		1227		1226		1225		1224		1223		1222		1221		1220		1219		1218		1217		1216		1215		1214		1213		1212		1211		1210		1209		1208		1207		1206		1205		1204		1203		1202		1201		1200		1199		1198		1197		1196		1195		1194		1193		1192		1191		1190		1189		1188		1187		1186		1185		1184		1183		1182		1181		1180		1179		1178		1177		1176		1175		1174		1173		1172		1171		1170		1169		1168		1167		1166		1165		1164		1163		1162		1161		1160		1159		1158		1157		1156		1155		1154		1153		1152		1151		1150		1149		1148		1147		1146		1145		1144		1143		1142		1141		1140		1139		1138		1137		1136		1135		1134		1133		1132		1131		1130		1129		1128		1127		1126		1125		1124		1123		1122		1121		1120		1119		1118		1117		1116		1115		1114		1113		1112		1111		1110		1109		11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of the revenue for 1931, the sum of \$10,000 was received from private companies. The balance of revenue for that year represents the amount received from municipal corporations after deducting the sum of \$10,000.00 collected from them in excess of the sums required to be paid by them for power supplied in the period. The revenue shown in the above statement for the fiscal years 1929, 1930 and 1931 is also subject to reduction to the extent of the reduction made in the revenue budget. The difference between the revenue and that of electricity for the fiscal year ending October 31st, 1932, in the amount of \$5,500, represents the sum of power sold to private companies, which was deducted in the statement of revenue by the Commission.

The results of operation in connection with the Rideau System show a condition in pleasing contrast to that prevailing in other systems investigated by us, in that the actual cost of power has been less than the estimated costs originally submitted to the municipal corporations, and this contrast is still more striking when consideration is given to the fact that in many cases the actual loads taken have been considerably less than the estimated loads. Doubtless the Commission in its original estimates of cost of power included provision for sinking fund payments, but not to the extent to which such payments ^{will} ~~shall~~ amount, as the estimated capital cost of the High Falls Development was greatly exceeded. As before pointed out, the sinking fund payments on present capital expenditure and based on the average power load for the year ending October 31st, 1922, will amount to \$7.42 per horse-power per annum. The part of the annual cost of power to the municipal corporations attributable to interest on the part of capital investment apportioned to them, amounted to \$17.94 for 1920; to \$22.14 for 1921, and to \$20.49 for 1922, per horse-power billed.

These figures are based on the total horse-power billed to the municipal corporations during the several years, which total includes power purchased from the Rideau Power Company. The proportion of power so purchased in 1922 to the total billed was approximately 18%, and the interest charges on capital cost, if apportioned to the 82% of power

The results of the investigation are summarized in the following table:

Table 1. Summary of the investigation results. The table shows the results of the investigation for the period from 1960 to 1962. The data is presented in the following format: Year, Total, and per horse-power per annum. The results are as follows:

Year	Total	per horse-power per annum
1960	100.00	100.00
1961	100.00	100.00
1962	100.00	100.00

The results of the investigation are summarized in the following table:

These figures are based on the total horse-power

which is the estimated population of the United States. The figures are based on the total horse-power which is the estimated population of the United States. The figures are based on the total horse-power which is the estimated population of the United States.

generated by the works of the system, would materially increase the figures given as the proportion of cost of power so generated. Even on the basis adopted in arriving at this proportionate part of the annual cost of power, the charge for interest on capital cost presents a strong contrast to the price paid for power to the Rideau Power Company, namely, \$14.00.

It is also to be borne in mind that, as is shown in our report upon interest charges payable to the Province, it is possible that in order that the Commission may be in a position to reimburse the Province the annual cost of money advanced for purposes of the Commission, it may be necessary for the Lieutenant-Governor in Council to fix a sum to be paid by municipal corporations to the Commission in addition to what has already been paid on account of interest.

The capital cost of the works of the system as of October 31st, 1922, has been apportioned by the Commission as follows:

Municipalities	Share of Capital Cost on which in- terest and fixed Charges are payable	Average horse-power supplied in year ending Oct. 31, 1922, after cor- rection for power factor.
Carleton Place	\$ 337,509.25	791.9
Kemptville	52,512.03	91.7
Lanark	23,086.50	32.4
Perth	218,790.71	499.0
Smith's Falls	<u>312,403.54</u>	<u>844.8</u>
Totals -Municipalities	\$ 944,302.03	2,259.8
Totals -Companies	<u>136,709.87</u>	<u>358.9</u>
Grand Totals -	\$1,081,011.90	2,618.7

generated by the works of the system, would materially in-
crease the figures given as the proportion of cost of power
so generated. Even on the basis adopted in arriving at this
proportion, one of the items of cost of power, the charge
for interest on capital cost, increases a slight amount in
the value of the power on the basis of the system, namely,
\$14.00.

It is also to be noted in this case, as in those
in our report upon interest charges payable to the Province,
it is possible that in order that the Commission may be in a
position to determine the Province the annual cost of money
advanced for the Commission, it may be necessary
for the Commission to determine in advance as to the cost of
such of material expenditures as the Commission is willing
to what has already been paid on account of interest.

The capital cost of the works of the system as of

January 1st, 1927, was determined by the Commission

as follows:

Statement of Capital Costs as of January 1st, 1927, and 1928, with charges and receipts		Average Investment required in each section and the total, with charges and receipts	
General Plant	\$ 107,225.25	General Plant	741.0
Transmission	22,212.45	Transmission	21.7
Substation	20,000.00	Substation	21.2
Other	12,700.00	Other	420.0
Total - 1927	162,137.70	Total - 1927	1,403.9
Total - 1928	162,137.70	Total - 1928	1,403.9
Total - 1927-1928	\$1,021,000.00	Total - 1927-1928	2,807.8

It will be noted that the total of \$1,081,011.90 is slightly in excess of the actual capital cost which amounted as before stated to \$1,079,746.80.

The share of capital cost apportioned as above to companies, namely, \$136,709.87, will, of course, have to be re-apportioned amongst the municipal corporations in the system in the event of the fixed charges in respect thereof not being met by revenues from companies or private consumers. In view of the shortage of power during certain seasons by reason of water conditions, additional capital expenditure will doubtless be necessary for further storage facilities before the rated capacity of the High Falls generating plant can be attained. Under present conditions, it appears that at times the plant has not been able to provide sufficient power to supply the requirements of the system, although over 400 horse-power of such requirements was purchased by the Commission from the Rideau Power Company.

The large capital expenditure for the comparatively meagre results obtained, the excess of such expenditure over originally estimated cost, and the employment to meet the capital cost of funds in the hands of the Commission, are subject matters in connection with the system which we deem worthy of the consideration of Your Honour. The burden cast upon the comparatively small municipalities in the system to recompense the Province for the large advances heretofore made and the other advances necessary to render the

It will be noted that the total of \$2,081,011.00 is slightly in excess of the stated original cost of the system as before stated to \$1,079,766.00.

The share of capital cost apportioned as above to re-apportioned amongst the municipal corporations in the system is the result of the various studies in various stages and before and by various other agencies in various systems in view of the situation of water supply during various periods of water conditions, additional capital expenditures still required or necessary for further system facilities before the completion of the long term program.

It is to be noted that the system is not yet completed and that at times the water has not been able to provide sufficient water to supply the requirements of the system, although with the improvement of the system and treatment by the Commission from the Edison Power Company.

The large capital expenditures for the system are being received through the various of such expenditures and are being estimated and the system is being built in such a manner that it is in line with the needs of the Commission, and subject matter in connection with the system which is being working of the Commission in the future. The system will also be subject to the Commission in the future to receive the proceeds for the large advances before the main and the other agencies necessary to develop the

works effective seems to us of vital interest, not only to these municipalities, but to the Province as a whole.

All of which is respectfully submitted.

DATED AT TORONTO, *Sept. 28th* 1923

W. D. Gregory, Chairman
M. J. Haney
Lloyd Harris
J. Allan Ross
R. A. Ross

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REPORT OF THE COMMISSIONER OF THE GENERAL LAND OFFICE
IN RESPONSE TO A RESOLUTION OF THE HOUSE OF COMMONS

AND OF THE COMMISSIONER OF THE GENERAL LAND OFFICE
IN RESPONSE TO A RESOLUTION OF THE HOUSE OF COMMONS

27 1882
DATED AT TORONTO

W. D. Gregory, C.M.G.
M. J. Henry
Lloyd Harris
J. Allan Ross

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